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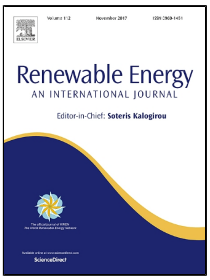

Electrochemical hydrogen storage properties of $NiAl_2O_4$/NiO nanostructures using TiO_2, SiO_2 and graphene by auto-combustion method using green tea extract

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Electrochemical hydrogen storage properties of $NiAl_2O_4$/NiO nanostructures using TiO_2, SiO_2 and graphene by auto-combustion method using green tea extract

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Abstract

$NiAl_2O_4$/NiO nanostructures were synthesized via an auto-combustion method using green tea extract. TiO_2, SiO_2, and graphene were used in order to enhance the electrochemical hydrogen storage performance of $NiAl_2O_4$. The structural analysis of host texture confirmed the formation of NiO alongside with $NiAl_2O_4$. Furthermore, the formation of nanocomposites and distribution of the additives on the surface of $NiAl_2O_4$/NiO nanostructures were affirmed by XRD and EDS spectra. The morphological analyses were displayed the nanoscale formation of the particles. Interestingly, the electrochemical hydrogen storage of the nanocomposites indicated that upon addition of TiO_2, SiO_2 and graphene, the discharge capacity enhanced as compare to the host material. The maximum discharge capacities of $NiAl_2O_4$/NiO and its respective nanocomposites containing SiO_2, graphene, and TiO_2 were observed at 850, 2000, 2750 and 3000 mAh/g, respectively.

Keywords: Spinel; Nanostructures; Hydrogen storage; Mesoporous; Chronopotentiometry.